Remarks

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Claims 5 and 6 have been amended to place the claims in more conventional form according to U.S. practice. Claim 5 has also been amended to correct a typographical error in the amount of sulfur. Support for 0.200% as the upper limit of sulfur can be found on page 9, line 1 of the specification. Claim 5 has also been amended to remove the "heat treatment" step, thus rendering moot the Examiner's rejection of claims 5 and 6 under the second paragraph of 35 U.S.C. § 112. New claims 7-9 have been added to recite the subject matter deleted from claim 5, including the preferred embodiments in original claim 5 for the amounts of Mn and Si.

With regard to the restriction requirement, as required by the Examiner, Applicant affirms the election of claims 5 and 6, with traverse. This election is made while reserving Applicant's rights under 35 USC § 121 to file a divisional application for the non-elected subject matter.

The patentability of the present invention over the disclosures of the references relied upon by the Examiner in rejecting the claims will be apparent upon consideration of the following remarks.

The provisional rejection of claims 5 and 6 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-7 of copending application 10/725,569 is rendered moot by the Terminal Disclaimer submitted herewith.

The rejection of claims 5 and 6 under 35 U.S.C. § 103(a) as being unpatentable over JP '823 in view of WO '686 is respectfully traversed.

The Examiner takes the position that JP '823 teaches the claimed steel composition, except for Pb, As, and thixoforging. The Examiner asserts that it is well settled that omission of an element and its function where not needed is obvious. Further, the Examiner relies on WO '686 as disclosing that thixoforging can be applied to different metallic materials. It is the position of the Examiner that it would have been obvious to one having ordinary skill in the art of the cited references at the time the invention was made to thixoforge alloy steel of JP '823 as taught by WO '686.

However, neither of the references relied on by the Examiner teaches or suggests the composition of the steel, as set forth in Applicant's claim 5. Further, the combination of the references does not suggest the composition set forth in the claims.

JP '823 describes a free-cutting steel, which is very different from the present invention. First, the C content in the steel of JP '823 is very low (<0.05%), while in the present invention it is $0.35 \leq C \leq 1.2\%$. Further, the steel of JP '823 contains large amounts of S (0.2-0.8%), while the present invention tolerates no more than 0.2%. Additionally, the steel of JP '823 contains P, Bi, Sn, As and Sb as impurities only, while the present invention requires a minimum content of 0.05% for their sum.

WO '686 concerns thixoforging various metals. (See Table 1 on pages 7 and 8 of the reference). However, the steels of WO '686 are very different from the steel of the present invention. For example, the tool steel H13 (page 8 of the reference) has a higher content of Cr and V than the present invention; WO '686 teaches 4.75 – 5.50 wt% Cr and 0.80 – 1.75 wt% V, compared to Applicant's requirement of traces $\leq Cr \leq 4.5$ wt% and traces $\leq V \leq 0.5$ wt%. Additionally, H13 does not mention the contents of Ni, Cu, P, Bi, Sn, As or Sb. The other two steels cited in the reference are stainless steels, and therefore are very different from the steels of the present invention.

Thus, as previously stated, neither of the references, taken alone or in combination, teaches or suggests the composition of Applicant's steel, as set forth in claim 5. Therefore, the combination of references does not teach or suggest Applicant's claimed method of hot-shaping a steel part, which comprises obtaining a billet of steel with the particular composition set forth in claim 5.

Furthermore, the steel of JP '823 would not be usable for a thixoforging process, because the low content of C gives the steel a solidification interval (the gap between solidus and liquidus temperatures) which is too narrow.

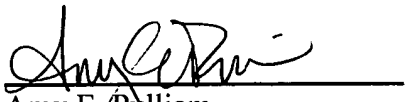
The purpose of JP '823 is to increase the life of tools during machining operations. The steels of JP '823 must have antagonist properties if an easy and economic machining is required. On the contrary, WO '686 teaches a tool steel, specifically free-cutting tools. No one skilled in the art would combine the teachings of these two references.

For these reasons, the invention of the pending claims is clearly patentable over JP '823 and WO '686.

Therefore, in view of the foregoing amendments and remarks, it is submitted that each of the grounds of rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

Respectfully submitted,

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